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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/681,334	10/09/2003	Hisaaki Gyoten	L8501.03102	8815

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EXAMINER

KALAFUT, STEPHEN J

ART UNIT	PAPER NUMBER
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1745

DATE MAILED: 05/18/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/681,334	Applicant(s) GYOTEN ET AL.	
	Examiner Stephen J. Kalafut	Art Unit 1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☐ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-5, 7-12, 14, 15, 17, 18 and 20-30 is/are rejected.
- 7) ☒ Claim(s) 6, 13, 16 and 19 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>(3 dates)</u> . | 6) <input type="checkbox"/> Other: ____. |

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The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-4, 8, 9, 10, 15, 17, 27 and 30 are rejected under 35 U.S.C. 102(b) as being anticipated by Brown *et al.* (EP 1,063,334), cited by applicants.

Brown *et al.* disclose a fuel cell with a solid electrolyte that includes a particulate, and thus granular material therein, such as silica (which would be glassy) or zirconium oxide, in sizes that range from 0.001 to 10 microns (section 0024). The electrolyte comprises Nafion, and optionally a polymer that does not conduct ions, such as PTFE (section 0014), which has the same chain moiety as Nafion, which is fluorocarbon. The inorganic materials would have the same mechanical properties, being some of the same as presently recited, and thus confer the increased resistance to creep and plastic deformation when placed under stress. The electrolyte membrane may have a thickness of 50 microns, which is greater than the size of any of the inserted particulate materials (section 0018).

Claims 1-4, 8, 9, 10, 15, 17, 27 and 30 are rejected under 35 U.S.C. 102(e) as being anticipated by Brown *et al.* (US 6,485,856).

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This document is the U.S. equivalent to EP 1,063,334 above, and thus discloses the same fuel cell, with an electrolyte that includes the same components. See column 4, lines 52-67, column 6, lines 1-3 and column 7, lines 36-47.

Claims 1-5, 17, 27 and 30 are rejected under 35 U.S.C. 102(b) as being anticipated by Mizuno (JP 7-135,003), cited by applicants.

Mizuno disclose a fuel cell with a solid electrolyte that includes a particulate, and thus granular material therein, made of a crosslinked polyacrylic acid salt, with a mean particle size of 20 microns. Due to its crosslinking, it would be physically stronger than the Nafion, and thus would confer the presently recited mechanical properties. See the Abstract and section 0026. Since the electrolyte membrane may have a thickness of 180 microns (section 0025), the granular polymer would have a smaller size. The granulated material may be present at an upper limit of 12 volume percent (section 0032).

Claims 1-3, 8, 17, 27, 28 and 30 are rejected under 35 U.S.C. 102(e) as being anticipated by Taft *et al.* (US 6,630,265).

Taft *et al.* disclose a fuel cell with a solid electrolyte that includes spherical colloidal silica dispersed therein, in sizes ranging from 0.005 to 10 microns (column 5, line 63 through column 6, line 6). The membrane has a thickness ranging from 10 to 200 microns, preferably 45 to 100 microns, which would mean that the silica would have a size smaller than the membrane. Being an inorganic solid, the silica would also confer the presently recited mechanical properties.

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The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 11, 12 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over either Brown *et al.* (either EP 1,063,334 or US 6,485,856), Mizuno (JP 7-135,003) or Taft *et al.* (US 6,630,265).

These claims differ from these references. by reciting a range of values for the equivalent weight of the polymer electrolyte. The recitation that the electrolyte is produced from a solution is treated under product-by-process practice, MPEP 2113. Since this is a method recitation in a product claim, it is thus not given patentable weight until it is shown to necessarily convey a new characteristic to the resulting product. The equivalent weight of the polymer would be a matter of optimization to the ordinary artisan, since it would have an effect on the ionic conductivity and water absorption of the polymer. For this reason, these claims would be obvious over Brown *et al.*, Mizuno or Taft *et al.* Since the insert materials disclosed by all of these references are different from the electrolyte polymer, they would have different equivalent weights and glass transition temperatures.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mizuno.

This claim recites that the insert material has an average outer dimension of 30 microns. While this is outside the range disclosed by Mizuno, the skilled artisan would be familiar with

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the effects of particle size, and the effects of scaling up, or making different sizes of fuel cells.

For this reason, this claim would be obvious over Mizuno.

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over either Brown *et al.* (either EP 1,063,334 or US 6,485,856) or Taft *et al.* (US 6,630,265).

This claim differs from Brown *et al.* and Taft *et al.* by reciting the insert members are present at from 1 to 50 percent by volume. However, the skilled artisan would be familiar with the effects of these members on the mechanical stability and ionic conductivity of the membrane, particularly since the insert members would have a different conductivity from the ionically conductive polymer of the membrane, and for some types of members, no ion conductivity. For this reason, this claim would be obvious over either Brown *et al.* or Taft *et al.*

Claims 18 and 20-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mizuno in view of D'Aleo *et al.* (US 6,372,372).

These claims differ from Mizuno by reciting a means that applies compressive force to the fuel cell stack. D'Aleo *et al.* disclose a PEM fuel cell stack (52), made of the same type of fuel cells as disclosed by Mizuno, and plates (54, 56) that combine to apply compression to the stack (column 3, lines 16-19). Because this device holds the stack together, while allowing the ends plates and reactant flow pipes to be made separately (column 3, lines 21-24), and because it is intended to be used with a PEM fuel cell, it would be obvious to use the compression device of D'Aleo *et al.* with the fuel cell of Mizuno.

Claims 18, 20-23 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taft *et al.* in view of D'Aleo *et al.*

These claims differ from Taft *et al.* by reciting a means that applies compressive force to the fuel cell stack. D'Aleo *et al.* disclose a PEM fuel cell stack (52), made of the same type of fuel cells as disclosed by Taft *et al.*, and plates (54, 56) that combine to apply compression to the stack (column 3, lines 16-19). Because this device holds the stack together, while allowing the ends plates and reactant flow pipes to be made separately (column 3, lines 21-24), and because it is intended to be used with a PEM fuel cell, it would be obvious to use the compression device of D'Aleo *et al.* with the fuel cell of Taft *et al.*

Claims 18, 20-23, 25 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brown *et al.* (either EP 1,063,334 or US 6,485,856), in view of D'Aleo *et al.*

These claims differ from Brown *et al.* by reciting a means that applies compressive force to the fuel cell stack. D'Aleo *et al.* disclose a PEM fuel cell stack (52), made of the same type of fuel cells as disclosed by Brown *et al.*, and plates (54, 56) that combine to apply compression to the stack (column 3, lines 16-19). Because this device holds the stack together, while allowing the ends plates and reactant flow pipes to be made separately (column 3, lines 21-24), and because it is intended to be used with a PEM fuel cell, it would be obvious to use the compression device of D'Aleo *et al.* with the fuel cell of Brown *et al.*

Claims 6, 13, 16 and 19 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the

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base claim and any intervening claims. The prior art cited herein or by applicant does not disclose a PEM fuel cell with an insert material comprising PTFE at a diameter of over 5 microns, the references being silent as to the size of any included PTFE; with an insert member having the same equivalent weight as that of the ionically conducting polymer; or with leaf glass.

Claims 12 and 14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The term “substantially different” would have indefinite scope, since the amount by which the two values differ is not specified thereby.

Claim 16 is objected to because of the following informalities: The term “electrolyte” is a misspelling. Appropriate correction is required.

The disclosure is objected to because of the following informalities: Drawing numerals 4 and 15 are not found in the specification. On page 3, line 4, the “separator” is given the number 3, but elsewhere on the page, and in the corresponding figure 7, it is given the number 73. Appropriate correction is required.

The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

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The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Gopal (US 6,602,630) discloses a polymer electrolyte membrane that is asymmetric in its composition. A computer-generated English translation of Mizuno is enclosed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen J. Kalafut whose telephone number is 571-272-1286. The examiner can normally be reached on Mon-Fri 8:00 am-4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

sjk



STEPHEN J. KALAFUT
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